Age, ageism and osteological bias: the evidence from Late Roman Britain

Rebecca Gowland

... how — without denying the flesh together — do we deal with that tattered coat upon a stick, the ageing body[1]

Until recently, concepts of old age and the elderly have received scant attention in the archaeological literature. This paper examines the way in which social and biological biases, both in the funerary record and in our approach to it, have contributed to the invisibility of the elderly. The funerary domain is a useful source of evidence for examining Roman perceptions of the life course because a direct connection can often be made between the chronological age of an individual and his or her mode of burial. Hitherto, much work has focused on the epigraphic evidence, commemorative inscriptions which furnish archaeologists with a record of personal relationships and ages-at-death and provide information on the social divisions and perceptions of stages of the Roman life course.[2] Several authors, however, have identified a number of shortcomings in the epigraphic evidence. For example, K. Hopkins[3] showed that the age-at-death distributions obtained from tombstones are "mostly demographically impossible and always highly improbable" when compared to model life-tables from appropriate developing populations. This, he noted, is in large part due to the numerous age- and sex-related commemorative biases.[4] Further, the nature of the commemorative biases differs throughout the empire. In Rome, for example, young females were more likely to be commemorated, while in N Africa there was a greater tendency to commemorate older individuals, often with greatly exaggerated ages.[5] Lastly, chronological age as reported on tombstones is not always a faithful record of time elapsed since birth. There appears to have been a much more fluid and relative attitude toward chronological age in the Roman world.[6] This presents an interesting contrast to our own rigid and unambiguous use of chronological age (see below).

My analysis will focus on an aspect of funerary evidence that is often overlooked by ancient historians who study the life-course: skeletal remains. Initially, osteological evidence was seen as a way of overcoming such "commemorative obfuscation", but recently the osteological component has been criticised (often with some justification) in terms of its ability to produce useable demographics from cemetery populations.[7] However, the criticisms have been overstated, and this has had the unfortunate consequence of increasing the marginalisation of an already under-utilised resource. The skeleton is a vital and important source of bio-cultural evidence. When analysed in relation to cultural context, it is a powerful tool for accessing social as well as biological information about past societies.[8] It seems nonsensical if in our study of past identity we neglect the physical remains of the very people we are attempting to access. It

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1 M. Waters, cited in A. Blaikie, *Ageing and popular culture* (Cambridge 1999) 138.

2 See T. G. Parkin, *Demography and Roman society* (Baltimore 1992); R. P. Saller, *Patriarchy, property and death in the Roman family* (Cambridge 1994); M. Harlow and R. Laurence, *Growing up and growing old in ancient Rome* (London 2002).

3 K. Hopkins, "On the probable age structure of the Roman population," *Population Studies* 20 (1966) 246 and 254-55.

4 Ibid. 247.

5 Using the data collected by McDonnell, Hopkins ibid. notes that, of 10,697 N African ages at death, 7% are over 90 years of age, whereas in Rome the figure is less than 1%.

6 For a discussion, see Harlow and Laurence (supra n.2) 12-13.

7 Parkin (supra n.2) 58 states: "the optimism of some scholars on the information to be derived from skeletons for detailed demographic analysis of the Roman Empire is wholly unjustified".

8 For examples of the importance of integrating skeletal remains with archaeological evidence, see C. S. Larsen, *Bioarchaeology* (Cambridge 1997), and the papers in R. L. Gowland and C. Knüsel (edd.), *Social archaeology of funerary remains* (Oxford 2006).

goes without saying that all forms of archaeological evidence are subject to biases and interpretative limitations for which we must make allowance, but rarely is the legitimacy of such evidence dismissed entirely.[9] The problems and biases of the funerary record specific to the analysis of old age will be detailed below; more constructively, this study will try to show the ways in which skeletal evidence can be harnessed for our study of age identities. I will address methodological criticisms and demonstrate the utility of new statistical techniques of age estimation, using a sample of skeletons excavated from Late Roman Britain. The skeletal evidence will then be integrated with the cultural evidence from the funerary domain in order to examine past perceptions of old age.

Before turning to the archaeological evidence, it is worth exploring what Western scholars mean by 'age' and 'old age', since this has some relevance for our perceptions of 'the elderly' in the past.

Old age and the life course

Time passes, skin wrinkles and sags, joints stiffen, thoughts become muddled: old age in Western consciousness is inextricably linked with the physicality of the ageing body. Imbued with mostly negative connotations, it is something to be defied rather than embraced. In terms of 'body capital', in a society where youthful bodies are privileged and coveted, the elderly can be thought of as suffering from 'negative equity', and as a consequence their social status is diminished. The weakening, degenerating body is also, on some level, perceived to be the external manifestation of the inner deterioration of the mind. Society views the frail, aged body and mind as unable to contribute; the elderly person is unproductive and is dependent in much the same way as a child, though stripped of the social benefits of youthfulness and future potential.[10] It is in part due to the social invisibility of the aged in our Western society that there has been a lack of attention to the theme within the archaeological record.

Over the last two centuries, average life-expectancy at birth in W Europe has risen from *c.*40 to 78 years.[11] In America, it is forecast that the proportion of individuals over 85 will double by the year 2030.[12] This is viewed as potentially catastrophic in terms of the burden it will place on society's resources (it is often referred to as a "socio-economic time-bomb" — unsurprisingly, given the way in which the elderly are characterised). This seismic demographic shift contributes to the insidious negative perception of old age.

Is this stereotypically negative view of old age universal, or is it primarily a product of today's escalating 'grey' demographic? If that is so, archaeologists should take care that we do not transfer our Western paradigms and norms onto a demographically distinct past. Research in anthropology and social history suggests that such a critical view of the aged is far from universal: in many societies the elderly are venerated and treated as a source of wisdom. Amongst groups where oral tradition is vital to cultural knowledge, the elderly may play an important rôle in maintaining and re-creating group identity by handing down and perhaps

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9 The negative attitude is most apparent in recent publications on Roman demography: e.g., W. Scheidel ("Progress and problems in Roman demography," in id. [ed.], *Debating Roman demography* [Leiden 2001] 1-82) writes that "... owing to the numerous pitfalls in assessing and extrapolating from osteological material, acceptance of the results of these studies usually requires a greater amount of faith and suspension of disbelief that most historians are ready to muster."

10 J. Hockey and A. James, *Growing up and growing old* (London 1993); J. Ginn and S. Arber, "'Only connect': gender relations and ageing," in S. Arber and J. Ginn (edd.), *Connecting gender and ageing: a sociological approach* (Buckingham 1995) 1-14.

11 M. R. Rose and L. D. Mueller, "Evolution of human lifespan: past, future, and present," *Am. J. Human Biology* 10 (1998) 409-20.

12 S. Sherman, "Human aging at the millennium," in C. J. Rosen, J. Glowacki and J. P. Bilezikian (edd.), *The aging skeleton* (California 1999) 11-18.

embellishing origin and by unifying myths.[13] And even in our own Western society one may question just how closely the negative stereotypes match the reality of the current social climate. For example, the socio-economic importance of grandparents, in helping to raise young children while both parents go to work, is beginning to be recognised.[14]

The invisibility of the elderly in archaeological discourse also relates to the fact that age *per se*, as an aspect of social identity, has been a subject of study only quite recently.[15] While gender and ethnicity have been deconstructed, age has remained impervious to similar treatment. The treatment of age as little more than a 'variable' has persisted, in part, because of the intimate link that has been forged in Western consciousness between age and time as a linear phenomenon.[16] It is only recently that researchers have appreciated that not all cultures relate age to time, and not all cultures view time as linear.[17]

About a decade ago, researchers in sociology distinguished between three separate types of age: chronological, biological, and social.[18] These definitions facilitated the acknowledgement of age as much more than the passing of time or a biological variable, but instead as a key factor in both individual identity and the social structuring of societies.[19] Archaeologists studying age now tend to distinguish between these three different types. However, age as an aspect of identity is much more complex than these categories would suggest. In physical anthropology it becomes apparent that these definitions are not discrete. For example, the age at death of a child, as estimated from the skeleton, may be considered to be a 'biological age', but in actual fact growth is impacted by a number of socially related factors (e.g., diet, illness). How, then, do we disentangle the two?

In this respect, the field of medical anthropology is also producing information concerning the inter-relationship between biology and culture. For example, amongst traditional Inuit males a hunting lifestyle necessitates a high degree of physical fitness. Once males become adept hunters, however, fathers are able to reduce their own hunting activities and will experience disproportionately rapid physical deterioration;[20] in this instance the physical process of ageing can be understood only within this particular cultural context.

As with other age identities, old age is culturally contingent. Even within specific populations, age interacts with other identities (gender, ethnicity, status), which all impact on the way that an older individual will be perceived.[21] While we may speak about 'the elderly' as a category, the process and experience of ageing is not homogenous even within a single society.

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13 S. J. Rasmussen, "From child bearers to culture bearers: transition to post-childbearing among Taureg women," *Medical Anthropology* 19 (2000) 91-116.

14 It is reputed to save British families upwards of a billion pounds a year: http://news.bbc.co.uk/1/hi/programmes/breakfast/2254091.stm (viewed Sept. 25, 2005).

15 E.g., see S. Crawford, "When do Anglo-Saxon children count?," *J. Theoretical Archaeology* 2 (1991) 17-24; J. Sofaer Derevenski, "Age and gender at the site of Tiszapolgár-Basatanya, Hungary," *Antiquity* 71 (1997) 875-89, and "Linking age and gender as social variables," *Ethnographisch-Archäologische Zeitschrift* 38 (1997) 485-93; R. Gilchrist, "Archaeological biographies: realizing human lifecycles, -courses and -histories," *World Arch.* 31 (2000) 325-28.

16 For a discussion of this from an anthropological perspective, see M. Fortes, "Age, generation, and social structure," in D. I. Kertzer and J. Keith (edd.), *Age and anthropological theory* (New York 1984) 99-122.

17 Ibid.

18 Arber and Ginn (supra n.10).

19 Sofaer Derevenski (supra n.15).

20 C. M. Beall, "Theoretical dimensions of a focus on age in physical anthropology," in Kertzer and Keith (supra n.16) 82-95.

21 S. Arber and J. Ginn, *Gender and later life* (London 1991); iid., "Choice and constraint in the retirement of older married women," in iid. 1995 (supra n.10) 69-86; H. Bradley, *Fractured identities* (Cambridge 1996). For a discussion of gender and ageing in archaeology, see Sofaer Derevenski (supra n.15).

The physicality of the ageing body plays an important rôle in shaping social perceptions; conversely, the physical body is also culturally conditioned.[22] This is of significance when we examine age identities from ancient skeletal remains; when analysing a skeleton, we are observing the impact of cultural factors as well as the passing of time. While chronological time is one significant component in physical deterioration, all bodies do not age in the same way or according to the same timetable. Further, just as different cultures have different perceptions of beauty, so age-related physical changes are not universally viewed in a negative light: not all societies place youth on a pedestal. Ultimately, then, people grow old within different social and physical environments which can all have a profound impact on the social and physical experience of ageing. When one examines the ageing process, the divide between biology and culture becomes particularly difficult to tease apart. Here I retain the categories of biological, social and chronological age because I intend to address the way that biases have operated against the archaeological study of the elderly in Romano-British cemeteries on all three of those levels: on chronological and biological levels, in terms of potential preservation biases against older individuals and the tendency for osteological techniques to under-estimate age at death; and on a social level, because there is a modern tendency to overlook older members of past societies.

Age-at-death

Life expectancy at birth for the Roman Empire is generally placed at between 20 and 30 years.[23] Such statistics tend to convey the impression that there would have been very few elderly individuals living. However, they are heavily influenced by the much higher ancient rates of infant and child mortality.[24] Average life expectancy is strongly dependent on fertility, higher fertility leading to a low mean age-at-death. Mortality profiles constructed from skeletal populations are more a reflection of fertility than mortality.[25] As is demonstrated by epigraphic evidence, people did reach old age in the past; they simply formed a much smaller proportion of the population than they do today.

Estimations of age-at-death made from skeletal remains have been used to produce mortality profiles and life-tables in order to study the demographic structure of past populations. With respect to Roman demography, since individuals of all classes and ages are likely to have been accorded an inhumation of some kind, analysis of skeletal evidence bypasses the problems of 'commemorative obfuscation' that frustrate reconstructions based on epigraphic evidence. However, many osteological studies of cemeteries have shown anomalously low numbers of individuals in the older age groups, particularly over 50 years. For some time it was believed that the small proportion of older individuals in cemeteries was a true reflection of the harsh realities of an age when medical intervention was, at best, rudimentary. However, palaeodemographers now consider the mortality profiles to be intrinsically flawed by methodological problems and by biases in skeletal preservation.[26] As a result, historians have argued

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22 For a discussion, see C. Gilleard and P. Higgs, *Cultures of ageing: self citizen and the body* (Harlow 2000) 126-43.

23 Parkin (supra n.2).

24 Rose and Mueller (supra n.11).

25 S. R. Johansson and S. Horowitz, "Estimating mortality in skeletal populations: influence of the growth rate on the interpretation of levels and trends during the transition to agriculture," *Am. J. Physical Anthropology* 71 (1986) 233-50; L. R. Sattenspiel and H. C. Harpending, "Stable populations and skeletal age," *American Antiquity* 48 (1983) 489-98; R. Storey and K. Hirth, "Archaeological and paleodemographic analyses of the El Cajón skeletal population," in R. R. Paine (ed.), *Integrating archaeological demography: multidisciplinary approaches to prehistoric population* (Univ. S. Illinois 1997) 136.

26 E.g., see N. Howell, "Village composition implied by a palaeodemographic life table: the Libben site," *Am. J. Physical Anthropology* 59 (1982) 263-69; J.-P. Bocquet-Appel and C. Masset, "Farewell to palaeodemography," *J. Human Evolution* 11 (1982) 321-33; T. Molleson and M. Cox, *The Spitalfields Project* vol. 2. *The anthropology. The middling sort* (York 1993); R. G. Aykroyd *et al.*, "Technical note:

that skeletal evidence has little to offer the study of Roman demography,[27] and that the results from skeletal evidence are too dissimilar to known, demographically sustainable, populations. A number of biases do indeed confront anyone studying cemetery evidence on a biological, chronological and social level, but they are not all insurmountable, nor do they negate the utility of skeletal analyses for studying age identity and mortality in Roman populations.

The ageing process

The study of age-related biological changes in humans is a burgeoning field, and particularly in the case of human senescence. The impetus derives largely from socio-economic and medical concerns about today's ageing population, but it is fuelled also by the cosmetic industry.[28] Considerable research in the social and medical sciences has considered the different ways in which the body degenerates, the biological mechanisms behind it, and the question of *why* human bodies degenerate at all.[29] The reason we live beyond our reproductive years is not something that is readily explained within evolutionary models, and has been the subject of some debate.[30] Other researchers have looked at the process of ageing itself, examining whether we are genetically pre-programmed gradually to degenerate, or whether the changes are simply the outcome of an accumulation of errors in cell reproduction.[31] Current research would appear to demonstrate that both factors contribute to the physiology of ageing. The level of consistency with which individuals age supports the assertion that a level of genetic pre-programming is likely.[32] That is not to say, however, that all age and degenerate in the same way or according to the same timetable: individual ageing is the result of a whole host of factors, both intrinsic to the individual (e.g., genetic predispositions, sex, etc.) and external (e.g., social and physical environment, diet, activities, etc.). It is a frustratingly variable process. This variability is also apparent with respect to age-related skeletal changes, and it complicates the process of estimating the age-at-death of adult skeletons.

In childhood and the growth period, because of the variety, rapidity and regularity of developmental changes that occur, it is possible to estimate age-at-death from the skeleton with a good degree of accuracy. Once the skeleton has reached maturity, a number of other skeletal characteristics are useful, including: observations of dental wear; the morphological changes of the auricular surface (the joint surface on the pelvis where it articulates with the base of the spine); and morphological changes occurring at the pubic symphysis (where the two halves of the pelvis join at the front). In adulthood, however, skeletal age has a more limited ability to serve as an indicator of chronological age, because morphological changes are related to degeneration and thus greatly influenced by factors other than time elapsed since birth. The variability (relating to genetic variability and differences in both the physical and cultural environment) in the rates at which both individuals and populations age is a problem for

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regression analysis in adult age estimation," *Am. J. Physical Anthropology* 104 (1997) 259-65; R. G. Aykroyd *et al.*, "Nasty, brutish, but not necessarily short: a reconsideration of the statistical methods used to calculate age at death from adult human skeletal and dental age indicators," *American Antiquity* 64 (1999) 55-70; P. L. Walker, J. R. Johnson and P. M. Lambert, "Age and sex biases in the preservation of human skeletal remains," *Am. J. Physical Anthropology* 76 (1988) 183-88; R. R. Paine and H. C. Harpending, "Effect of sample bias on palaeodemographic fertility estimates," *Am. J. Physical Anthropology* 105 (1998) 231-40.

27 Parkin (supra n.2); Scheidel (supra n.9).

28 Expenditure on "anti-ageing nutritional compounds" in the USA is over 15 billion dollars: Gilleard and Higgs (supra n.22) 134.

29 D. A. Nelson and M. L. Weiss, "Aging through the ages," and S. Sherman, "Human aging at the millennium," both in Rosen *et al.* (supra n.12) 3-10 and 11-18.

30 Sherman ibid.

31 Ibid.

32 Ibid.

skeletal ageing, and there is little that biological anthropologists can do other than account for this variability statistically.

A much-discussed problem with skeletal ageing is the statistical biases associated with many age-estimation techniques. This is particularly pertinent to the study of old age in the past since it is thought to be largely responsible for the dearth of elderly individuals identified by archaeologists in cemeteries. In 1982, an influential paper by J.-P. Bocquet-Appel and C. Masset claimed that the age distributions obtained for archaeological populations were to some extent dependent on the age structure of the known age reference sample from which a particular technique was devised. This raised questions about comparing age profiles from cemeteries where osteologists used different age-estimation techniques (which comes on top of problems created by the use of different age-categories). This statistical bias is responsible for the under-ageing of older individuals in past populations[33] because many of the current ageing methods are based on known age samples made up of individuals with a very different age-at-death distribution (i.e., large numbers of young adults, very small proportions of older adults) than one expects to find in 'normal' attritional cemeteries.[34] The problems associated with statistical bias are now being tackled by several researchers (see below).[35]

Bayesian analysis of Late Roman cemeteries

It has recently been stated that all future ageing techniques should use Bayesian statistics as a means of minimising under-ageing.[36] Bayesian data analysis allows us to make inferences from data using probability models;[37] it is used widely in the social and medical sciences and increasingly in archaeology (e.g., radiocarbon dating).[38] From a palaeodemographic perspective, Bayesian techniques have been shown to remove this 'attraction of the middle' that we see with conventional methods and which, it has been argued, results in a peak in ages-at-death often being noted at *c.*35 years.[39] Where Bayes' Theorum differs from other statistical modelling techniques is in its use of prior probabilities, whereby assumptions about the outcome are explicitly stated and incorporated into the analysis of the data.[40]

For the purposes of this study, a Bayesian method was used in order to examine the demography of 4 Romano-British cemeteries: Lankhills and Victoria Road at Winchester, and Queensford Farm/Mill and Cassington in Oxfordshire. I consider adult skeletons only, with a

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33 Bocquet and Masset (supra n.26); Aykroyd *et al.* 1997 (supra n.26); iid. 1999 (supra n.26).

34 For example, some of the known age samples used to produce skeletal ageing methods were dead soldiers with a very attenuated age range (e.g., the pubic symphysis method by T. W. McKern and T. D. Stewart, "Skeletal age changes in young American males," *Quartermaster research and development command, Technical Report EP-45*), or derived from forensic cases (e.g., the pubic symphysis method used by S. T. Brooks and J. M. Suchey, "Skeletal age determination based on the os pubis: a comparison of the Ascadi-Nemeskeri and Suchey-Brooks methods," *Human Evolution* 5 [1990] 227-38).

35 E.g., see the papers in R. D. Hoppa and J. W. Vaupel (edd.), *Paleodemography: age distributions from skeletal samples* (Cambridge 2002); A. T. Chamberlain, "Problems and prospects in palaeodemography," in M. Cox and S. Mays (edd.), *Human osteology in archaeology and forensic science* (London 2000) 101-16; L. W. Konigsberg and S. R. Frankenberg, "Estimation of age structure in anthropological demography," *Am. J. Physical Anthropology* 89 (1992) 235-56; L. W. Konigsberg and S. R. Frankenberg, "Palaeodemography: 'not quite dead'," *Evolutionary Anthropology* 3 (1994) 92-105; L. W. Konigsberg and S. R. Frankenberg, "Deconstructing death in palaeodemography," *Am. J. Physical Anthropology* 117 (2002) 297-309.

36 R. D. Hoppa and J. W. Vaupel, "The Rostock manifesto for paleodemography: the way from age to stage," in Hoppa and Vaupel ibid. 1-8.

37 A. Gelman *et al.*, *Bayesian data analysis* (London 1995) 3.

38 E.g., C. E. Buck, W. G. Cavanagh and C. D. Litton, *Bayesian approach to interpreting archaeological data* (Chichester 1996).

39 Supra n.35.

40 See Chamberlain (supra n.35).

particular focus on the elderly. I recorded all of the auricular surfaces and pubic symphyses, where preserved, from each of the adult skeletons, using the methods of C. O. Lovejoy and colleagues and S. T. Brooks and J. M. Suchey, respectively.[41] These data were then used to produce age-at-death distributions for each cemetery by a Bayesian method of age estimation.[42] This method does not estimate an age-at-death for each individual; instead, it generates the mortality distribution from the range of age-indicator stages observed at each cemetery, using probability models. For demographic studies, it is the age distribution of the entire population rather than of individuals that is required. Thus this approach is more likely to produce credible results than if one were to undertake the usual process of generating an age distribution from a compilation of individual ages.

In the use of Bayesian statistics, the choice of prior probability is important since it can have a significant effect on the results obtained. A number of different approaches can be adopted when choosing a prior.[43] For this study the prior probabilities were based on model life-tables. Previous analyses have suggested that life expectancy for the Roman period was between *c.*20 and 30 years,[44] so the Coale and Demeney[45] Model West life-tables with life expectancy of 30 years were used to produce the model priors. However, in order to observe the effect that the choice of prior has on the results, the analysis was repeated for one of the cemeteries using priors based on Model West life-tables with life expectancy of 20 years.[46]

With conventional methods of analysis, a peak in mortality commonly occurs at *c.*30-40 years of age.[47] Figures 1-2 show age distributions obtained from the auricular surfaces and pubic symphyses, respectively; they demonstrate that, when using a method based on Bayes' Theorum, this peak is eliminated. Encouragingly, the age distributions obtained for the same sites with the use of different skeletal age-indicators are very similar. For Cassington and Victoria Road, the age-at-death distribution approximates closely with what one would expect from an attritional population (i.e., a normal population with individuals dying from natural causes over a long period of time), giving a life expectancy of 30 years when using the auricular surface (fig. 1) or the pubic symphysis (fig. 2). By contrast, Queensford and Lankhills demonstrate greater numbers of younger adults and fewer older adults when either the pubic symphysis or auricular surface is used. Figure 3 compares the age distributions obtained from the auricular surfaces for Lankhills when using different prior probabilities: although the use of priors based on different life expectancy models (with life expectancy at the time of birth set at 20 years and 30 years) does have an impact on the results, it is encouraging to note that this does not cause a marked change. This, together with the fact that different sites are exhibiting slightly different age distributions, indicates that these results are 'real', as opposed to being a product of the method used.

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41 C. O. Lovejoy *et al.*, "Chronological metamorphosis of the auricular surface of the ilium: a new method for the determination of adult skeletal age at death," *Am. J. Physical Anthropology* 68 (1985) 15-28; Brooks and Suchey (supra n.34).

42 For further details, see R. L. Gowland and A. T. Chamberlain, "Detecting plague: the palaeodemographic characterisation of a catastrophic death assemblage," *Antiquity* 79 (2005) 146-57; iid., "Estimating age-at-death from the pubic symphysis: past, present, and future," in S. R. Zakrzewski and M. Clegg (edd.), *Proc. British Assoc. of Biological Anthropology and Osteoarchaeology Conference 2003* (Oxford 2005) 123-31.

43 For further discussion, see Chamberlain (supra n.35); Gowland and Chamberlain in Zakrzewski and Clegg (supra n.42).

44 Parkin (supra n.2); Scheidel (supra n.9).

45 A. J. Coale and P. Demeny, *Regional model life tables and stable populations* (Princeton, NJ 1983).

46 These are the standard life expectancies used by a number of scholars examining Roman demography; they have been accepted as useful approximations of past age structures: Scheidel (supra n.9) 11 and 21.

47 This can be seen in the mortality distribution for Butt Road, Colchester (fig. 5). The skeletal data is taken from the site report: N. Crummy, P. Crummy and C. Crossan, *Excavations of Roman and later cemeteries, churches and monastic sites in Colchester, 1971-88* (Colchester Archaeological Reports 9, 1993).

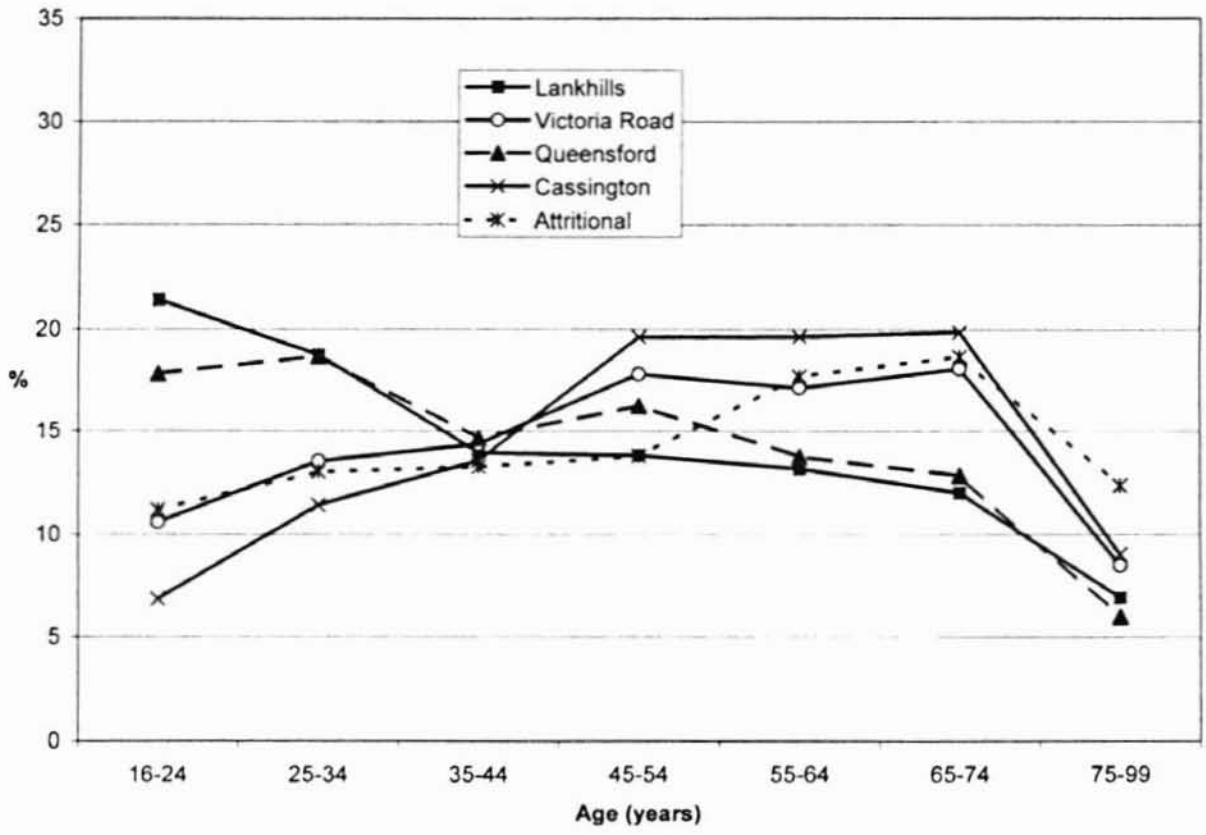

Fig. 1. The age distribution produced from Romano-British cemeteries derived from the auricular surface using the method devised by Gowland and Chamberlain, *Antiquity* 2005 (supra n.42).

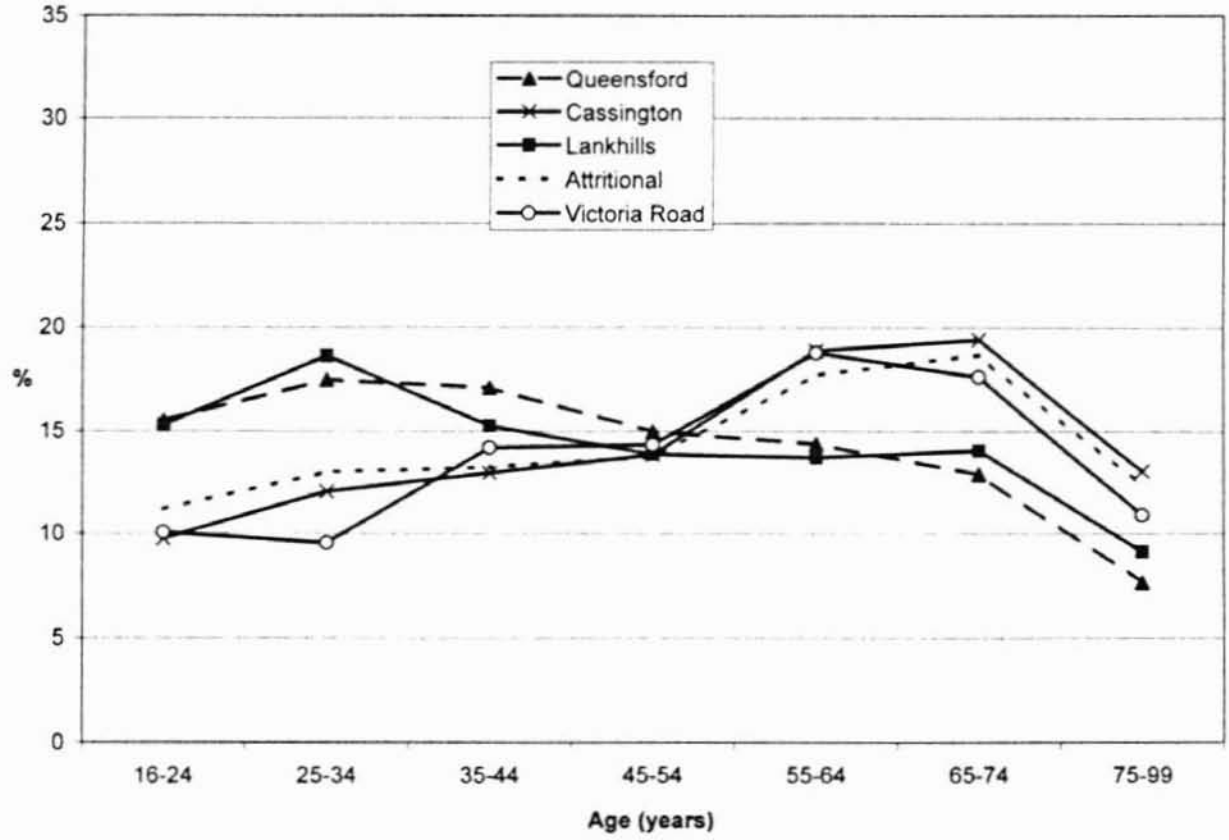

Fig. 2. The age distribution produced from Romano-British cemeteries derived from the pubic symphysis, using the method devised by Gowland and Chamberlain, *Antiquity* 2005 (supra n.42).

The method by which these age-at-death distributions were produced is straightforward, yet generating age distributions in this way appears to produce credible results. At the very least, it overcomes a number of criticisms levelled at demographics that are derived from skeletal remains. Current Bayesian methods for ageing *individuals* are considerably more com-

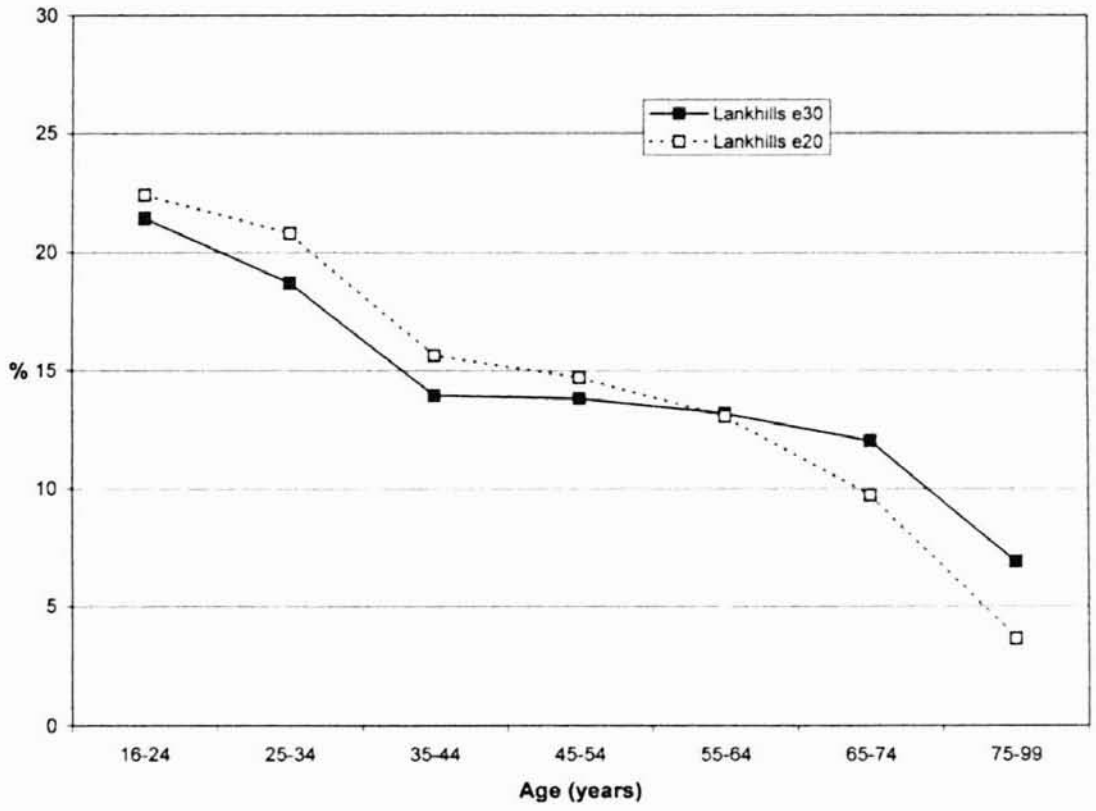

Fig. 3. A comparison of the age distributions for Lankhills derived from the auricular surface and two different model prior probabilities.

plicated,[48] but attempts are being made to produce user-friendlier methodologies that can at least address some of the biases and account statistically for the problem of individual variability.[49] In future, the variability in human skeletal ageing should at least be able to be openly stated through the use of confidence limits, so that ages may be expressed reliably, if not as precisely as one would wish.

One could argue, of course, that it is our insistence on the use of chronological age that is potentially problematic when examining past populations. As many anthropologists have discussed, chronological age is essentially an ethnocentricity.[50] Should we, then, be using an analytical variable that has no actual relevance for the population being studied? Is 'biological age' in the form of skeletal age stages a more useful means of comparing individuals and populations?[51]

Taphonomy

In dealing with skeletal remains from cemeteries, there are also preservation biases to contend with. The differential survival of skeletal remains of individuals of different ages and sex has been the focus of a number of studies.[52] The poorly mineralised nature of infant bones

48 E.g., J. L. Boldsen *et al.*, "Transition analysis: a new method for estimating age from skeletons," in Hoppa and Vaupel (supra n.35) 73-106.

49 R. Samworth and R. Gowland, "Estimating adult skeletal age-at-death: statistical assumptions and user-friendly tables," *Int. J. Osteoarchaeology* 16 (2006) 1-15.

50 Fortes (supra n.16).

51 M. Jackes argues the case for comparing skeletal age stages rather than chronological age in "Building the basis for paleodemographic analysis: adult age determination," in M. A. Katzenberg and S. R. Saunders (edd.), *Biological anthropology of the human skeleton* (New York 2000) 151.

52 E.g., Walker, Johnson and Lambert (supra n.26); P. L. Walker "Problems of preservation and sexism in sexing: some lessons from historical collections for palaeodemographers," in S. R. Saunders and A. Herring (edd.), *Grave reflections: portraying the past through cemetery studies* (Toronto 1995) 31-48; Paine and Harpending (supra n.26).

has been discussed as a reason for their under-representation.[53] However, it is not just the bones of infants that are poorly mineralised; in modern populations, bone mass peaks by about 20 years of age, then reduces at a rate of *c.*1% per year, with the possibility of an early menopausal acceleration in females.[54] The bones of older adults, particularly females, are significantly less mineralised and more susceptible to decay. As a consequence, taphonomic factors may contribute significantly to the under-representation of older individuals in cemetery populations.

Some of the key areas for the age estimation of adults are located on the pelvis. The pelvis has a high proportion of spongy cancellous bone compared to the more robust, dense and compact bone present in higher proportions, for example, in the shafts of long bones and the cranium and is thus more susceptible to post-depositional diagensis.[55] This is particularly the case for the pubic symphysis, which is delicate and located in a position where, when the skeleton is supine, it is more likely to suffer from physical damage. Table 1 shows the proportion of individuals at the Late Romano-British sites for which the auricular surfaces and pubic symphyses were sufficiently well preserved to be used for age estimation. The proportion of the overall number of adult skeletons for which these age-indicators could be recorded is rather small, particularly so for the pubic symphysis.

TABLE 1

PRESERVATION OF AGE-INDICATORS AT EACH OF THE ROMANO-BRITISH SITES

Site	*number of adults*	*pubic symphysis*	*auricular surface*
Lankhills	307	67 (21.8%)	114 (37.1%)
Cassington	53	18 (33.9%)	37 (69.8%)
Victoria Road	68	21 (30.9%)	40 (58.8%)
Queensford Farm/Mill	91	30 (32.9%)	47 (51.6%)

One would expect the poor survival of skeletal age-indicators to be exacerbated in the already demineralised bones of older individuals.[56] It has been argued elsewhere that the majority of those skeletons in cemeteries whose age could not be determined as a result of poor preservation are likely to be older adults.[57] Several scholars have argued that this produces a real effect on a cemetery's demographics,[58] although others have debated the extent of the problem for sites where preservation was less than very poor.[59]

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53 E.g., C. G. Gordon and J. E. Buikstra, "Soil pH, bone preservation, and sampling bias at mortuary sites," *American Antiquity* 46 (1981) 566-71; F. E. Johnston and L. O. Zimmer, "Assessment of growth and age in the immature skeleton," in M. Y. İscan and K. A. R. Kennedy (edd.), *Reconstruction of life from the skeleton* (New York 1989) 11-21; H. Goode, T. Waldron and J. Rogers, "Bone growth in juveniles: a methodological note," *Int. J. Osteoarchaeology* 3 (1993) 321-23.

54 M. S. LeBoff and J. Glowacki, "Sex, steroids, bone, and aging," in Rosen *et al.* (supra n.12) 159-74. It has also been noted that age-related bone loss amongst females may be greater in Romano-British than in modern populations: S. A. Mays, "Age-related cortical bone loss in women from a 3rd-4th century A.D. population from England," *Am. J. Physical Anthropology* 129 (2006) 518-28.

55 See T. Waldron, "The relative survival of the human skeleton: implications for palaeopathology," in A. Boddington, A. N. Garland and R. C. Janaway (edd.), *Death, decay and reconstruction. Approaches to archaeology and forensic science* (Manchester 1987) 55-64; P. L. Walker, "Greater sciatic notch morphology: sex, age, and population differences," *Am. J. Physical Anthropology* 127 (2005) 383-91.

56 See A. Galloway, P. Willey and L. Snyder, "Human bone mineral densities and survival of bone elements: a contemporary sample," in W. D. Haglund and M. H. Sorg (edd.), *Forensic taphonomy: the postmortem fate of human remains* (Boca Raton, LA 1997) 295-315; C. F. Merbs, "Eskimo skeleton taphonomy with identification of possible polar bear victims," ibid. 249-62.

57 M. Jackes, "Palaeodemography: problems and techniques," in S. R. Saunders and M. A. Katzenberg (edd.), *Skeletal biology of past peoples* (New York 1992) 189-224.

58 Merbs (supra n.56) 261; Walker, Johnson and Lambert (supra n.26); Paine and Harpending (supra n.26).

59 J. E. Buikstra, "Paleodemography: context and promise," in R. R. Paine (ed.), *Integrating archaeological demography: multidisciplinary approaches to prehistoric populations* (Univ. S. Illinois 1997) 370; C. M.

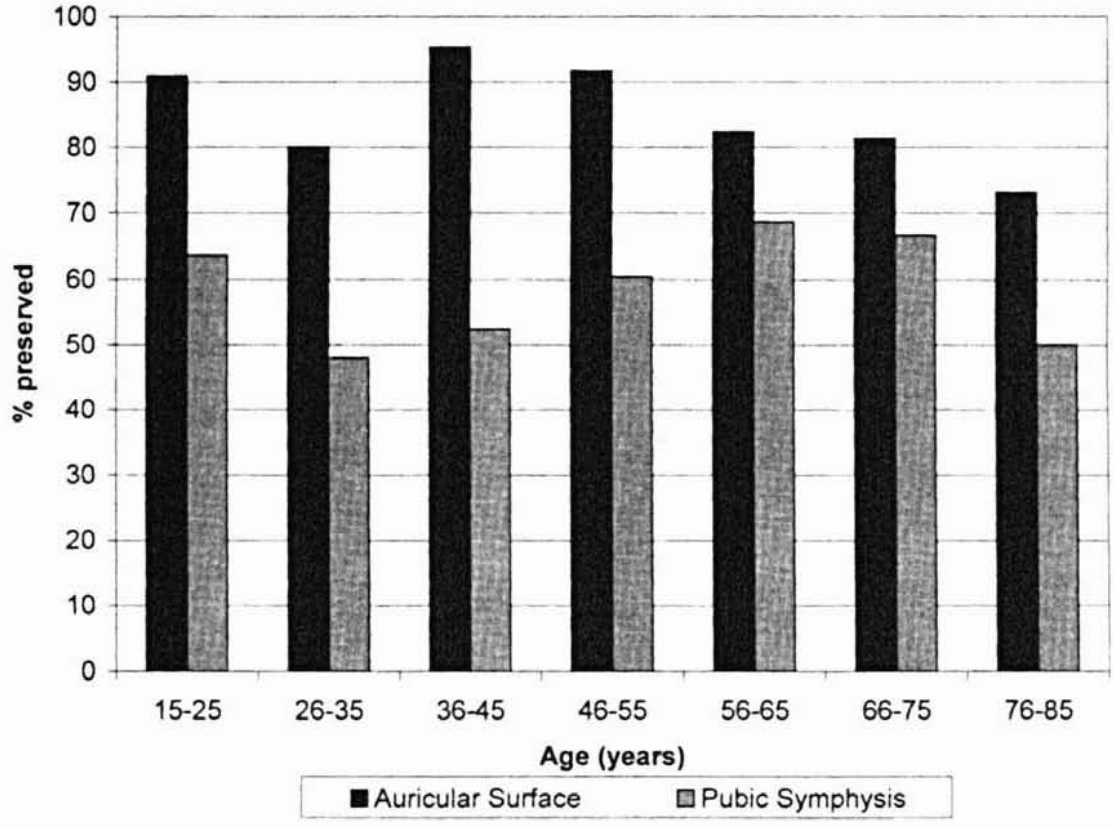

Fig. 4. The proportions of individuals in the Spitalfields collection in each age group whose skeletal age-indicators were sufficiently well preserved to provide an estimate of age-at-death.

In order to examine the potential age-related differential effects of taphonomic bias, one has to use a collection of individuals of known ages. I recorded the preservation of the auricular surfaces and pubic symphyses in relation to age-at-death in individuals from the 18th-c. collection at Spitalfields of skeletons of known age. Figure 4 shows the percentage of individuals in each age category whose auricular surfaces or pubic symphyses were sufficiently well preserved to yield an age estimate. As it shows, there is a slight decrease in the number of age estimates obtainable from the auricular surface with advancing age, but the pubic symphysis shows no such pattern. No clear or significant correlation between preservation of these skeletal age-indicators and the age at death was apparent in this collection, but what bearing these results, drawn from a relatively recent and well-preserved sample of human skeletons, will have for populations of antiquity and of poorer overall preservation may be open to question.

While the age-indicators located on the pelvis are susceptible to diagenesis, teeth often survive well in a variety of soil conditions. Dental-wear methods of age estimation are based upon patterns of wear exhibited by the molars, of which there are three on each side of the upper and lower jaws (in practice, the lower molars are more often used for age-estimation). In situations of poor preservation, age estimates rely heavily, if not solely, on the dentition.[60] However, when one or more of these molars is lost *ante mortem*, it affects the nature of the wear-patterns on the remaining molars, thus potentially invalidating this method as a tool for age-estimation. Since older individuals are more likely to have lost one or more of their molar teeth through disease, this will create a bias against their identification.

In situations of poor preservation, it is likely that the remains of older individuals will suffer disproportionately. The extent of the impact of this taphonomic bias is open to question,

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Stojanowski, R. M. Seidemann and G. H. Doran, "Differential skeletal preservation at Windover Pond: causes and consequences," *Am. J. Physical Anthropology* 119 (2002) 15-26.

60 Though commonly used as a method of age estimation, dental wear is affected by dietary factors that have nothing to do with age. Dental-wear ageing standards are not equally applicable to all populations.

and it is likely to vary between cemeteries, but this should not be used as a reason for disregarding such evidence.

Old age and sex determination

Determination of sex is considered to be more straightforward and reliable than estimating age at death from skeletons. A number of morphological and metric differences between male and female skeletons, particularly in the regions of the pelvis and skull, form the basis of sex-determination techniques. A number of sexing categories are used by biological anthropologists, partly because of uneven preservation, but also because the extent and nature of sexual dimorphism exhibited by skeletons varies considerably both within and between populations. This is the result of a complex interplay between genetics, the environment, and culture.[61]

Particularly pertinent here is the observation that sexually dimorphic features do not remain static throughout the life course. For example, it has been argued that the cranio-facial characteristics of females may become more masculine with advancing age.[62] Post-menopausal alterations in hormones often lead to a thickened cranial vault[63] that may result in incorrect determinations of sex, particularly when the skull is fragmentary. Conversely, for males of advanced years, some facial characteristics may become more gracile; for example, many older individuals have endentulous jaws (loss of all teeth), leading to resorption of the alveolar bone of the mandible. This factor, together with the inability to masticate tough foods, results in a loss of muscle markings; ultimately, the jaw becomes more gracile, or 'feminine', in appearance. Other cranial and post-cranial muscle-attachment markings may become less defined with age, leading to a skeleton with less robust, hence more sexually ambiguous, characteristics. Recently, P. Walker[64] has noted that changes in pelvic morphology throughout adulthood occur such that "young males are thus likely to be misclassified as females, and elderly females are likely to be misclassified as males". As well as having demographic repercussions, these changing characteristics, associated as they are with soft tissue changes,[65] may have profound implications for social identity — the fluidity with age of physical features contributing to, and reinforcing, changing perceptions of masculinity and femininity.[66]

Social biases and funerary practice

Finally, some real social biases have conspired against the archaeological study of old age. In today's ageing society, the elderly are often denigrated and the nature of old age as a category has been found to be problematic. Various scholars argue that old age came to be perceived as a problem only in the early 20th c., and sociologists find that this attitude can be traced back to the introduction of a mandatory retirement age.[67] Retirement precipitated disempowerment for many elderly, bringing about a forced dependency and leaving little access

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61 See J. R. Sofaer, *The body as material culture* (Cambridge 2006) 89-116; Walker (supra n.55).

62 Walker (supra n.52); some studies have shown an increase in cranio-facial dimensions in adulthood of between 0 and 22%, with females showing the greatest increase: M. E. Hamilton, "Sexual dimorphism in skeletal samples," in R. L. Hall (ed.), *Sexual dimorphism in Homo Sapiens: a question of size* (New York 1982) 107-63.

63 D. J. Ortner and W. G. J. Putschar, *Identification of pathological conditions in human skeletal remains* (Washington 1985).

64 Walker (supra n.55) 389.

65 See C. Wilkinson, *Forensic facial reconstruction* (Cambridge 2004).

66 See also J. Sofaer, "Gender, bioarchaeology and human ontogeny," in R. Gowland and C. Knüsel (edd.), *The social archaeology of funerary remains* (Oxford 2006) 155-67.

67 W. A. Achenbaum, "Historical perspectives on aging," in R. H. Binstock and L. K. George (edd.), *Handbook of aging and the social sciences* (4th edn., New York 1996) 145; T. K. Haraven, "Changing images of ageing and the social construction of the life course," in M. Featherstone and A. Wernick (edd.), *Images of ageing* (London 1995) 119-34; Hockey and James (supra n.10).

to money and status.[68] In the Western consciousness, through language and imagery, the elderly have become both feminised and infantilised.[69] S. Arber and J. Ginn[70] argue that parallels can be drawn between the social construction of women as the weaker sex and the construction of old age. Confinement to the domestic sphere, along with the loss of rigidly-defined gender rôles between many elderly couples, has contributed to the blurring of gendered identities;[71] thus age often becomes their overriding identity, over gender. In Western society, the physicality of the ageing body almost entirely defines the identity of the elderly.[72]

With respect to archaeology, it seems that contemporary Western attitudes towards old people have seeped into interpretations of funerary evidence, with scholars making associations between reduced social status and old age. They have interpreted the apparent reduction in the number of grave goods buried with children and old people as "demonstrating that deaths among neither group created much social stress".[73] It is also problematic to assume that burial ritual is solely a product of the degree of "social disruption" caused by the death of an individual. As S. Humphreys[74] suggests:

> ... it is an obvious ethnocentric mistake to assume that the behaviour evoked by death is to be seen solely as a reaction to the disruptions of social and emotional equilibrium caused by a particular decease. Death provides occasions and materials for a symbolic discourse on life — through the different treatments accorded to those whose lives have ended in different ways and at different stages of development, through theories about what happens in the after-life, through the symbols used in funerary rites or eschatology to express the contrast between life and death.

Interpreting perceptions of old age from the burial evidence is complex due to the symbolic nature of the burial rite itself. Various authors have addressed this issue; suffice it to say that a direct 'reading' of any aspect of burial practice — in particular, grave goods — in terms of any single social identity is contentious.

A specific focus on old age in the past is also problematical. As C. Keith and colleagues discuss: "to start by asking 'At what age does a person become old?' imposes a notion that there is a category called old and that it has a chronological basis".[75] Textual sources indicate that there was no firm chronological basis for 'old age' at Rome, and there is no reason to suppose that the situation was any different in the provinces.[76]

What we can do, however, is look at the mode of burial of people of different ages to see if there are any changing patterns through the life course. For the Romano-British period, where burial rites are often uniform and undifferentiated, this approach may have only limited success. At some sites, however, one may observe age-related patterns in the deposition of grave goods in terms of their type, quantity, and position in relation to the body. A brief example can be provided by the skeletal evidence and grave goods from the sites of Lankhills, Winchester[77]

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68 Haraven (supra n.67).

69 Ginn and Arber (supra n.10); Hockey and James (supra n.10).

70 Arber and Ginn (supra n.21) 18.

71 G. Wilson, "I'm the eyes and she's the arms: changes in gender roles in advanced old age," in Ginn and Arber (supra n.10) 98-113.

72 Hockey and James (supra n.10).

73 G. Halsall, "Female status and power in early Merovingian Central Austrasia: the burial evidence," *Early Medieval Europe* 5 (1996) 1-24, quotation on 22.

74 S. C. Humphreys, "Introduction: comparative perspectives on death," in ead. and H. King (edd.), *Mortality and immortality: the anthropology and archaeology of death* (London 1981) 1-14, quotation on 9-10.

75 C. Keith, C. L. Fry and C. Ikels, "Community as context for successful aging," in Binstock and George (supra n.67) 245-63, quotation on 246. See also Cokayne and Harlow in this volume.

76 For a discussion, see Harlow and Laurence (supra n.2) 117-31; T. Parkin, "Out of sight, out of mind: elderly members of the Roman family," in B. Rawson and P. Weaver (edd.), *The Roman family in Italy* (Oxford 1997) 123-48.

77 G. Clarke, *The Roman cemetery at Lankhills* (Oxford 1979); skeletal data was recorded by myself.

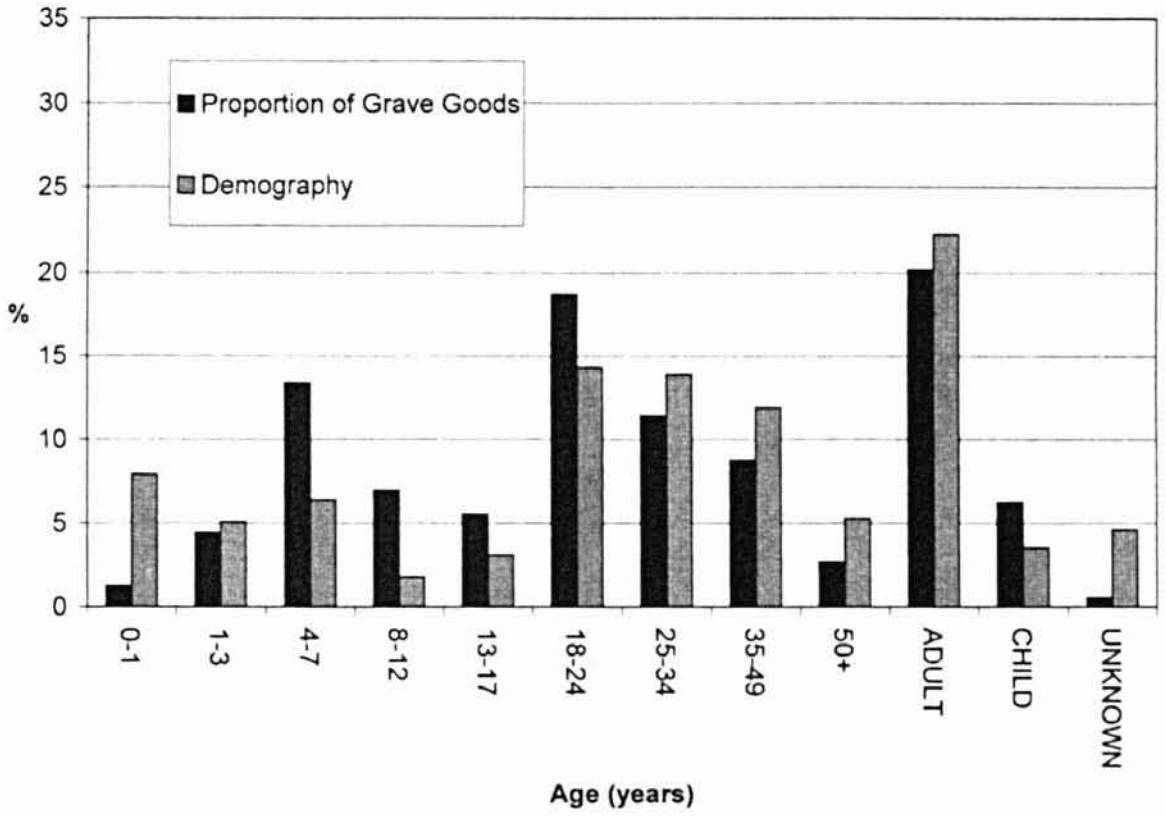

Fig. 5. The demography of the Lankhills cemetery population and the proportion of the overall quantity of grave goods buried with each age-group.

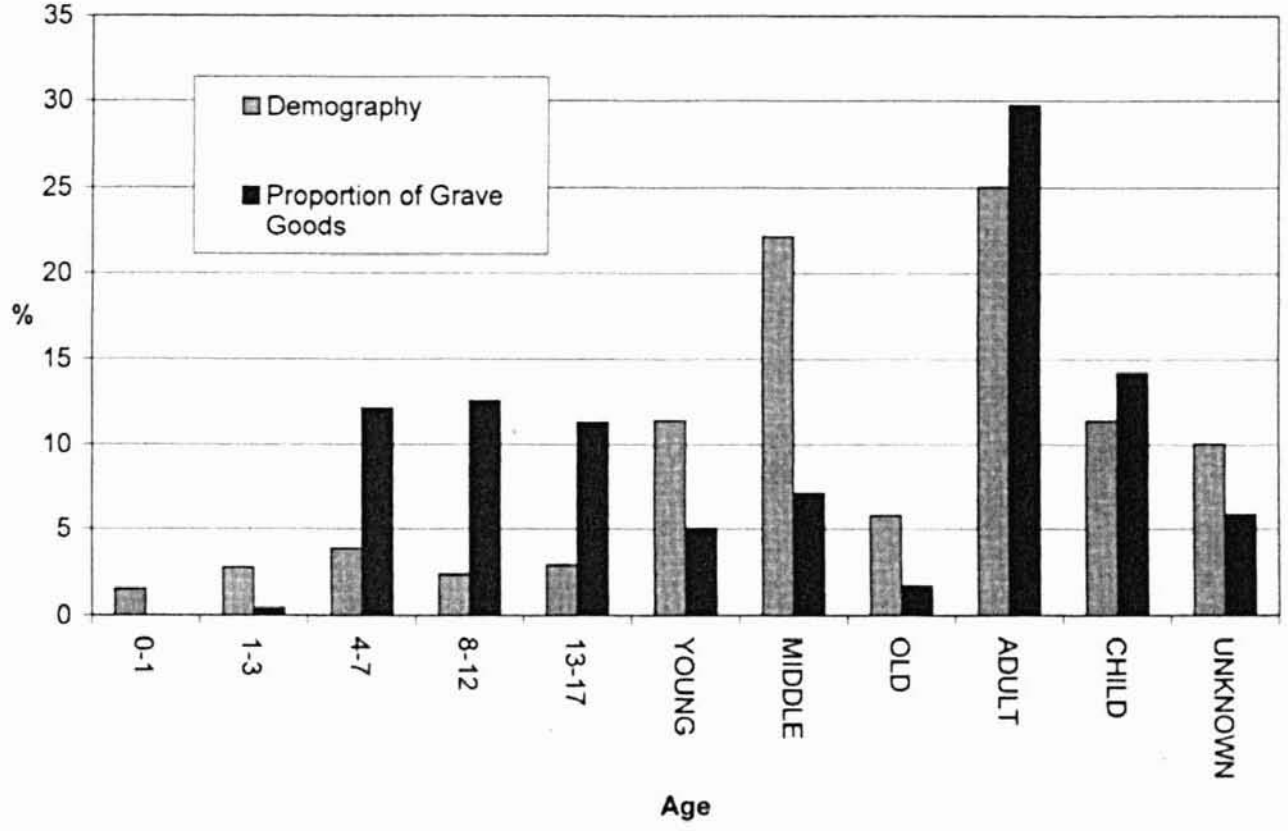

Fig. 6. The demography of the Butt Road cemetery population and the proportion of the overall quantity of grave goods buried with each age-group (note that the categories 'young', 'middle' and 'old' refer to 'adult' age groups), using data from Crummy, Crummy and Crossen (supra n.47).

and Butt Road, Colchester.[78] Figures 5-6 show the demography of the burial population and the proportion of the overall number of grave goods buried with each age and sex.[79] One of the striking features at both sites is the quantity of grave goods buried with those whom we would class as children.[80] At Butt Road, this presents a notable contrast with the few items buried with the older 'adult' groups. At Butt Road, between the 13-17 and 18-24 age-categories there is a sharp drop in the numbers of grave goods buried; this is in contrast to Lankhills, where the quantity of goods actually increases in the 18-24 age-category, before dropping afterwards. Common to both sites are the few numbers of grave goods buried with older individuals of the 50+ age-category. At Lankhills, young females were occasionally buried with large deposits of jewellery, whereas females older than 35 tended to be buried only with a single worn piece of jewellery, if anything.[81] At Butt Road, items of jewellery amongst individuals over the age of 17 were markedly less common in any of the 'adult' categories. At both sites, finger-rings were one of the few items of jewellery buried with older females, and these were always worn.

A link has often been made between the apparent 'reduced status' (as interpreted from grave goods) of older females and the loss of their reproductive rôle.[82] Ethnographic and historical evidence indicates that there is often an increase in gender ambiguity in the material culture associated with the very old, but this tends to be only indirectly associated with age (as a result of factors such as the marriage of a child or widowhood).[83] While one must be cautious when making inferences concerning social identity from burial evidence, the findings from Lankhills and, to a lesser degree, Butt Road indicate that gender does not appear to be an overt, or the most important, part of the overall social persona in later life. It does not necessarily follow, however, that social status is also reduced, nor does gender ambiguity in material culture necessarily relate to an androgynous identity in old age; rather (as researchers in other fields have noted), facets of identity become renegotiated as people age. The ethnographic literature contains numerous examples of women enjoying an increased freedom in rôles as they get older, and they often become involved in activities typically reserved for men;[84] as a result, many have access to more powerful social rôles.[85] Thus a reduction in grave-goods should not necessarily be interpreted as a loss of status; it may reflect an alteration in gender signification in old age. In the final analysis, the pattern observed would seem to indicate that some younger females were being buried with exceptional quantities of goods, rather than older females being particularly neglected; older women may have passed on items of jewellery to their daughters at marriage, or bequeathed them as heirlooms.[86]

Amongst the males at Lankhills, a number of individuals are buried with cross-bow brooches; we note an association with older males (over 35, and usually older). One could surmise that they were associated with positions of power or status achieved with age, rather than as

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78 Crummy, Crummy and Crossan (supra n.47): skeletal data is taken from the site report. Note the peak in the number of individuals in the 'Middle Adult' age category; this is likely to relate, at least in part, to the biases in skeletal age-estimation previously discussed.

79 It is important to consider these together as there are almost always fewer older individuals. A drop in the quantity of grave goods with these individuals is sometimes misinterpreted as relating to poorer burials rather than fewer individuals.

80 For a more detailed discussion of these burials, see R. L. Gowland, "Playing dead: implications of mortuary evidence for the social construction of childhood in Roman Britain," in G. Davies, A. Gardner and K. Lockyear (edd), *TRAC 2000* (Oxford 2001) 152-68.

81 See R. L. Gowland, "Beyond ethnicity: social identity in late Roman and early Anglo-Saxon England," *Anglo-Saxon Studies in Archaeology and History* (forthcoming) for a more detailed discussion.

82 Halsall (supra n.73); N. Stoodley, *The spindle and the spear: a critical enquiry into the construction and meaning of gender in the early Anglo-Saxon burial rite* (Oxford 1999).

83 S. J. Rasmussen, "Interpreting androgynous woman: female aging and personhood among the Kel Ewey Tuareg," *Ethnology* 26 (1987) 17-30; id. (supra n.13).

84 Rasmussen (supra n.83); id. (supra n.13).

85 H. Moore, *A passion for difference* (Cambridge 1994).

86 E. Swift, *The end of the western Roman Empire* (Oxford 2000) 42 and 72-77.

signifiers of a specific ethnic identity, as is usually suggested. Harlow and Laurence[87] believe that at Rome men in middle age were at the height of their powers and authority; possibly the evidence from Lankhills indicates the same. It would also fit in with the work of others who suggest that burials with belt sets and cross-bow brooches reflect a more overt display of power by local leaders by the late 4th c.[88]

At both sites, significant numbers of adult skeletons could not be aged or sexed. One wonders what proportions of these individuals might have been elderly, and what changes would be wrought to the overall age pattern if they had been identified.

This brief look at age-related practices at two Romano-British cemeteries has highlighted some similarities between those who were likely to be buried with grave goods and those more commonly commemorated on tombstones.[89] This may relate to the fact that the primary mourner was often a more significant component in determining the burial rite than was the deceased.[90] When we interpret burial evidence, we tend to focus on the identity of the interred. While this is relevant, it is mainly through the eyes of the bereaved, within societal constraints, that one glimpses the deceased. Age and gender identity are lived relationally; thus the variation in funerary practice accorded throughout various stages of the life course are likely to reflect and reproduce these changing relationships.

Conclusions

I have focussed on the elderly in Late Roman Britain, using evidence from cemeteries, to consider the inter-relationship between the physical and social body as it ages. It has been necessary to address some criticisms levelled at the use of skeletal analysis for accessing age and demographic data. I do not deny that there have been shortcomings in our interpretation of the archaeological evidence, on a chronological, biological and social level, which have contributed to the apparent invisibility of elderly people. We must exercise care so as not to interpret as 'real' what may be taphonomic biases against the survival of elderly bones or statistical shortcomings of skeleton-ageing methods. However, many of the criticisms used to dismiss the utility of skeletal evidence for ancient demography are being addressed today, and skeletal studies of cemetery populations should not be disregarded, particularly as techniques of analysis continue to improve.

With regard to identifying and interpreting age-related aspects of social identity, Romano-British cemeteries are relatively sparsely furnished, but patterns can still be noted, although they have tended to be overlooked. In order to examine the way that an age group is perceived within a society, we must contextualise it within a study of identity throughout the entire life span. A nuanced appreciation of the way that identity changes over the life course yields a better understanding of the various stages of life in Roman Britain. Finally, the skeletal evidence can play a much greater rôle than the simple correlation between skeleton and grave accoutrements. The plasticity of the human skeleton[91] means that it can serve as an archive or memory of an individual's life, something that has been referred to as an 'osteobiography'.[92]

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87 Harlow and Laurence (supra n.2) 118.

88 J. Pearce, *Case studies in a contextual archaeology of burial practice in Roman Britain* (Ph.D. diss., Univ. of Durham 1999) 164; G. Halsall, "The Merovingian period in north-east Gaul: transition or change?" in J. Bintliff and H. Hamerow (edd.), *Europe between late antiquity and the Middle Ages* (Oxford 1995) 38-57.

89 The commemorative bias towards younger females, and their occasional burial with greater numbers of grave goods, is a striking similarity.

90 This point has been made for epigraphic evidence but tends not to be emphasised with regard to other funerary evidence.

91 Sofaer (supra n.61).

92 J. Robb, "Time and biography: osteobiography of the Italian Neolithic lifespan," in Y. Hamilakis, M. Pluciennik and S. Tarlow (edd.), *Thinking through the body: archaeologies of corporeality* (London 2002) 153-71.

Bones and teeth store information concerning diet, geography at different life stages, childhood health stress, adult trauma, lifestyle and activities. Accessing this information and comparing individuals may prove to be illuminating when used in conjunction with contextual evidence. Unfortunately, this very plasticity also means that the body's 'memory' can be very selective and short-term. The body moulds to the physical demands of the moment; the bony evidence of an individual's younger life is often lost, yet traces in the elderly skeleton may tell tales of physical onslaughts and a life lived.

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